

Desired Results

**Standard**

**MAFS.7.NS.1.3:** Solve real-world and mathematical problems involving the four operations with rational numbers.

*Cognitive Complexity: Level 2, Basic Application of Skills and Concepts*

[Access Point](#)

**MAFS.7.NS.1.AP3a:** Solve real-world and mathematical problems involving the four operations with rational numbers from -100 to 100.

**Supporting Standard(s)**

*When students work toward meeting this standard (which is closely connected to 7.NS.1.1 and 7.NS.1.2), they consolidate their skill and understanding of addition, subtraction, multiplication and division of rational numbers.*

**MAFS.7.NS.1.1:** Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

**MAFS.7.NS.1.2:** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

[Access Point](#)

**MAFS.7.NS.1.AP.1a**

Identify rational numbers that are an equal distance from 0 on a number line as additive inverses.

**MAFS.7.NS.1.AP.1b**

Find the distance between two rational numbers on a number line.

**MAFS.7.NS.1.AP.2a**

Solve single-digit rational number multiplication problems using a number line.

**MAFS.7.NS.1.AP.2b**

Solve division problems with quotients from -100 to 100 using a number line.

**MAFS.7.NS.1.AP.2c**

Write equations to represent rational number multiplication and division problems solved on a number line and generate rules for the products and quotients of rational numbers.

**MAFS.7.NS.1.AP.3a**

Solve real-world and mathematical problems involving the four operations with rational numbers from -100 to 100.

**Unpacked Standard Concepts**

**Students will know . . .**

(Underlined Nouns/Noun Phrases)

- Real-world problems
- Mathematical problems
- Four operations with rational numbers

**Unpacked Standard Skills**

**Students will be able to . . .**

(Circled Verbs/Verb Phrases)

- Solve

**Prerequisite Knowledge and Skills Within Standard (Implied)**

For more information: <http://www.p21.org>

- Critical thinking and problem-solving skills
- Flexibility and adaptability
- Attention and self-regulation
- Creativity and innovation skills

**Instructional Implications of the Standard (Instruction Needed to Ensure Student Mastery of the Standard)**

- Students must be provided with the opportunity to utilize a variety of tools to solve problems involving the four operations with rational numbers (e.g., visual models to solve the problem).
- Review/reteach students understanding of addition and subtraction, including utilization of a horizontal/vertical number line.
- Review/reteach understanding of multiplication/division (including fractions).
- Explicitly teach and model critical thinking and problem solving skills
- Support students' critical thinking and problem-solving skills
- Support students' focus, attention and self-regulation
- Support creativity and innovation skills

<b>Learning Goal</b>  I can solve real-world and mathematical problems involving the four operations with rational numbers.	<b>Essential Questions (In student-friendly language)</b>  In real life, when would I need to add, subtract, multiple, and/or divide rational numbers? What is an efficient strategy for solving real-world problems with rational numbers? What tools could I use to solve real-world problems involving the four operations with rational numbers?
<b>IEP Learning Goal</b>  I can solve real-world and mathematical problems using addition, subtraction, multiplication, or division with rational numbers, with 85% accuracy on quizzes and test where operations from -100 to 100 are assessed by the end of the school year.	

<b>High Probability Barrier(s)</b> (widespread or common)  Wide-spread or common barriers that impact many students' engagement and learning (e.g., integrate strategies that support cognitive processing through academic instruction, DI, provide adequate instructional time)	<b>High Intensity Barrier(s)</b> (a few students deal with intensely)  Significant impact on individual student engagement and learning (e.g., small group & individual instruction, Differentiated Instruction (DI), aligned with learning needs)
Instruction:	Instruction:
Curriculum:	Curriculum:
Environment:	Environment:
Learner:	Learner:

<b>Instructional Design</b> Depending upon the anticipated barriers above, what implications would these have on the design of your lesson(s) regarding this standard.		
<b>Tier 1</b>	<b>Tier 2</b>	<b>Tier 3</b>
<b>Specially Designed Instruction (SDI)</b>		

## Assessment Evidence

### Performance Tasks:

- Add, subtract, multiply, and divide positive and negative fractions
- Evaluate a numerical expression
- Rewrite complex fractions as simple fractions in lowest terms
- Solve a real-world problem that involves finding the average of positive and negative decimal numbers
- Solve a real-world problem involving divisions of fractions

Note: Students should not be limited to fractions but receive practice with rational numbers in various forms within the same problem to address the standard

### Other evidence:

Scale	
4	In addition to score 3.0, I can explain my thinking.
3	In addition to score 2.0, I can: <ul style="list-style-type: none"> <li>▪ Add, subtract, multiply and divide rational numbers</li> <li>▪ Create and solve real world problems with rational numbers</li> <li>▪ Create and solve mathematical problems with rational numbers</li> </ul>
2	I can: <ul style="list-style-type: none"> <li>▪ Understand the concepts, symbols, and vocabulary for positive and negative number</li> </ul>
1	With help, I can have partial success with 2.0 content

## Test Item Specs

([http://fsassessments.org/wp-content/uploads/2015/08/Grade7-FSA-ItemSpecs-508\\_Final\\_052217.pdf](http://fsassessments.org/wp-content/uploads/2015/08/Grade7-FSA-ItemSpecs-508_Final_052217.pdf))

Content Standard	<b>MAFS.7.NS The Number System</b>  <b>MAFS.7.NS.1 Apply and extend previous understanding of operations with fractions.</b> <ul style="list-style-type: none"><li>• <b>MAFS.7.NS.1.3</b> Solve real-world and mathematical problems involving the four operations with rational numbers.</li></ul>									
Assessment Limits	Numbers in items must be rational numbers. Complex fractions may be used, but should contain fractions with single-digit numerators and denominators.									
Calculator	Neutral									
Item Types	Equation Editor Multiple Choice Multiselect Table Item									
Context	Allowable									
Sample Item		Item Type								
At 8:00, the temperature was 6 degrees Celsius ( $^{\circ}\text{C}$ ). Three hours later, the temperature was $-13^{\circ}\text{C}$ .  By how many degrees Celsius did the temperature change?		Equation Editor								
The change in the price of a certain brand of cereal from 2010 to 2012 is shown in the table. <table border="1"><thead><tr><th>Year</th><th>Change (in dollars)</th></tr></thead><tbody><tr><td>2010</td><td>+0.30</td></tr><tr><td>2011</td><td>+0.20</td></tr><tr><td>2012</td><td>-0.20</td></tr></tbody></table> In 2009 the price of cereal was \$3.69.  What was the price of the cereal at the end of 2012?		Year	Change (in dollars)	2010	+0.30	2011	+0.20	2012	-0.20	Equation Editor
Year	Change (in dollars)									
2010	+0.30									
2011	+0.20									
2012	-0.20									
See Appendix for the practice test item aligned to this standard.										

<b>Learning Experiences</b> <a href="http://accesstofls.weebly.com/math-resources.html">http://accesstofls.weebly.com/math-resources.html</a>	
Concrete Understandings	Representations
<ul style="list-style-type: none"> <li>• Provide a template for student to determine the sign of the final answer</li> <li>• Model setting up an equation and using a calculator to solve a problem</li> <li>• Use manipulatives to model multiplication and division with integers</li> <li>• Create an array of objects into groups to model the role of equal groups in a multiplication situation. (Make equal groups of objects and recognize different groups can be the same quantity.)</li> <li>• Given a set number of manipulatives, distribute them evenly to create a deficit (e.g., given 10 markers distribute 1 each to 15 students).</li> <li>• Create an array of objects for the mathematical equation and match the answer symbol (+ or -) following multiplication rules for an equation.</li> <li>• Engage with LearnZillion video and manipulatives to model multiplication and division with integers. <ul style="list-style-type: none"> <li>○ LearnZillion video: multiply a positive integer by a negative integer by thinking about equal groups <a href="#">Click for link</a></li> <li>○ Multiply a negative integer by a positive integer by thinking about equal groups <a href="#">Click for link</a></li> </ul> </li> <li>• For teacher background knowledge <a href="#">Click for link</a></li> <li>• Khan Academy video: interpreting multiplication and division of negative numbers <a href="#">Click for link</a></li> <li>• Khan Academy video: multiplying and dividing negative numbers word problems <a href="#">Click for link</a></li> </ul>	<ul style="list-style-type: none"> <li>• Use tools, as needed, to complete the four operations with integers.</li> <li>• Create a pictorial array for the mathematical equation and match the answer symbol (+ or -) following multiplication rules for an equation.</li> <li>• Create a pictorial array for the mathematical equation and match the answer symbol (+ or -) following division rules for an equation.</li> <li>• Given a scenario, students can use operations to solve problems. (e.g., 10 students can fit on a school bus, 35 students have signed up for a field trip. How many buses do they need?)</li> <li>• Understand the concepts, symbols, and vocabulary for: positive number, negative number.</li> </ul>
<b>Additional CPALMS Resources:</b> <a href="http://www.cpalms.org">www.cpalms.org</a> <ul style="list-style-type: none"> <li>• 19 STEM Lessons – Model Eliciting Activity (MEAs)</li> <li>• 5 MFAS Formative Assessments</li> <li>• 26 Lesson Plans</li> <li>• 6 Tutorials</li> <li>• 3 Problem-Solving Tasks</li> <li>• 2 Assessments</li> <li>• 1 Teaching Idea</li> <li>• 1 Unit/Lesson Sequence</li> <li>• 6 Student Resources</li> <li>• 1 Parent Resource</li> </ul>	<b>Supports and Scaffolds:</b> <ul style="list-style-type: none"> <li>• Calculator</li> <li>• Manipulatives</li> <li>• Arrays</li> <li>• Multiplication Tables</li> <li>• Interactive Whiteboard</li> <li>• Online Calculator</li> <li>• Visual Models and Virtual Manipulatives</li> </ul>